DOCUMENT RESUME

ED 240 339 CE 038 249

TITLE Solar Systems and Energy Management Controls. Final Report, 1982-83.
INSTITUTION Bergen County Vocational-Technical High School, Hackensack, N.J.
SPONS AGENCY New Jersey State Dept. of Education, Trenton. Div. of Vocational Education and Career Preparation.
PUB DATE 83
NOTE 34p.; For related documents, see CE 038 250-253.
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Conservation Education; Course Content; *Curriculum Development; *Energy Conservation; Equipment Maintenance; Heat; Heating; Housing; Instructional Materials; Job Skills; *Job Training; Material Development; Postsecondary Education; Power Technology; Repair; *Solar Energy; Technical Education; Trade and Industrial Education; Wind (Meteorology)
IDENTIFIERS *Bergen County Vocational Technical Schools NJ

ABSTRACT

This project was conducted by the Bergen County Vocational-Technical Schools (1) to develop a practical awareness of energy conservation and management techniques for both commercial and domestic applications; (2) to develop four training courses to teach solar troubleshooting and maintenance, commercial energy management control, domestic energy management, and photovoltaics and wind power; and (3) to purchase and install energy management control and solar equipment to teach both conservation and solar energy applications. In consultation with advisory councils, professionals in the field of energy management and solar energy, and instructors of various technical disciplines, the preliminary plans for four trade extension courses were developed by the project coordinator, a field specialist in the heating, ventilating, and air conditioning trade with expertise in solar and renewable energy sources. The project coordinator finalized curricula for the four courses and analyzed proposed equipment purchases from technical viewpoints. The following four courses were developed: Energy Management Controls, Energy Conservation for Residential Dwellings, Solar Troubleshooting and Maintenance, and Photovoltaics and Windpower Systems. (Author/KC)

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FINAL REPORT

OF

SOLAR SYSTEMS AND ENERGY MANAGEMENT CONTROLS

1982-83

BERGEN COUNTY VOCATIONAL-TECHNICAL SCHOOLS
200 HACKENSACK AVENUE
HACKENSACK, NEW JERSEY 07601
(201) 343-6000

Project Director
Dr. John Grieco
Business Administrator

CE038249

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NATIONAL INSTITUTE OF EDUCATION
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

This project reported herein was conducted pursuant to a contract from the New Jersey Department of Education. Division of Vocational Education and Career Preparation. It was funded under Section 123 of Public Law 94-482.

Project Duration: September 1, 1982
Beginning Date

June 30, 1983
Ending Date

The Contractors undertaking this project were encouraged to express fully their judgements in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official funding agency positions or policies.

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IDENTIFICATION NO. SENG - 304 AMOUNT FUNDED $31,800

FUNDED UNDER SECTION 123 OF P. L. 94-482

PROJECT TITLE: SOLAR SYSTEMS AND ENERGY MANAGEMENT CONTROLS

LEGAL NAME OF APPLICANT DISTRICT, INSTITUTION OR AGENCY: Board of Education of the Vocational School in the County of Bergen

ADDRESS: 200 Hackensack Avenue, Hackensack, New Jersey 07601

PROJECT DIRECTOR: Dr. John Grieco, Business Administrator

TELEPHONE NUMBER: (201) 343-6000 (Area Code)

ABSTRACT

DESCRIPTION OF PROJECT

(Use this sheet and no more than one other to type in single-spaced form a statement of project objectives, procedures that were followed, state and local priorities emphasized and the expected contribution of the project to vocational education.)

OBJECTIVES:

Solar Systems and Energy Management Controls is a second year energy education project which emerged from a need to develop an informed and reliable technical work force for the design, installation, testing and evaluation of solar heating and cooling systems through the education of existing technically qualified personnel in the plumbing, HVAC and electrical industries. The project aimed; (1) to develop a practical awareness of energy conservation and management techniques for both commercial and domestic applications; (2) to develop four training courses to teach solar troubleshooting and maintenance, commercial energy management controls, domestic energy management, photovoltaics and wind power; (3) to purchase and install energy management control and solar equipment to teach both conservation and solar energy applications.

PROCEDURES:

In consultation with advisory councils, professionals in the field of energy management and solar energy, and instructors of various technical disciplines, the preliminary plans for four trade extension courses were developed by the Project Coordinator, a field specialist in the heating, ventilating and air conditioning trade who has considerable expertise in solar and renewable energy sources. The Project Coordinator, who was hired by the Director to oversee the project, finalized curricula for the four courses and analyzed proposed equipment purchases from technical and educational viewpoints.

CONTRIBUTION TO EDUCATION:

Four comprehensive trade extension courses were developed. Course titles are the following: Energy Management Controls, Energy Conservation for Residential Dwellings, Solar Troubleshooting and Maintenance, and Photovoltaics and Windpower Systems.

ACKNOWLEDGEMENTS

The Project Director, Dr. John Grieco, and Project Coordinator, Mr. Albert Brunner, would like to extend special thanks to the following people for their guidance, support and suggestions contributed throughout this project:

Members of the Board of Education of the Vocational School in the County of Bergen

Members of the Bergen County Energy Advisory Board

Members of the Energy Advisory Council, Bergen County Vocational-Technical Schools

Robert G. De Gennaro, Administrator of the Building and Grounds Department, who supervised finish work for the solar facility.

The Project Director and Coordinator also extend thanks to the Secretarial staff of the Adult Division for their clerical assistance, and to the trade extension teachers in various technical disciplines who contributed ideas to this project.

BERGEN COUNTY VOCATIONAL-TECHNICAL SCHOOLS
ADULT DIVISION
HACKENSACK, NEW JERSEY 07601

OVERVIEW OF THE ADULT ENERGY TECHNOLOGY PROGRAM

The Energy Technology Program for adults consists of technical training courses offered exclusively by the Bergen County Vocational-Technical Schools and a college-credit certificate program offered in conjunction with Bergen Community College.

Technical training courses offered through the Trade Extension Division include Air Conditioning and Refrigeration, Oil Burner Technician Training, Blueprint Reading and Estimating for the HVAC Trades, Sheet Metal Layout and a new program in Solar and Energy Management Systems which was instituted last year. In addition to these part-time technical training programs, the School operates a full-time intensive training program for HVAC mechanics.

The new solar program is designed for trades people (HVAC mechanics plumbers, electricians) to help them develop an awareness of alternate energy sources such as solar and to gain skills in the areas of solar installations and energy evaluation and management.

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The following materials are submitted with this report:

Syllabus: Energy Management Controls

Syllabus: Energy Conservation for Residential Dwellings

Syllabus: Solar Troubleshooting and Maintenance

Syllabus: Photovoltaics and Windpower Systems

INTRODUCTION

History

Solar Systems and Energy Management Controls follows a previous RPP energy education project entitled Comprehensive Energy Education.

Comprehensive Energy Education focused on the development of skills with solar energy systems for technically qualified personnel in the trades (i.e., those employed by the plumbing, electrical and HVAC industries). This year's solar systems and Energy Management Controls aimed to develop an understanding of systems controls, troubleshooting and maintenance, and integration of the principles of solar energy and traditional energy sources for the purpose of energy evaluation and management.

To complement both projects, a demonstration facility for alternate energy sources was erected by the school. The building is powered by solar and other renewable energy sources. This facility houses the solar and energy management equipment and serves both as a classroom and as a demonstration center.

Problem

Over the last several years, considerable attention has been focused nationally on solar energy and energy management. Although technicians will be needed to analyze, design, install and maintain solar systems, the current regional requirements of New Jersey show a need to incorporate skills with renewable energy sources into existing building trades and other energy technologies. Additionally, a strong focus is currently being placed on energy conservation and management.

Problem (cont'd.)

Conservation is of particular interest because of its potential money savings. Sophisticated energy management equipment is available on the market to promote efficient use of energy in the commercial environment.

The Bergen County Vocational-Technical Schools envisioned that initiation of solar energy education designed specifically for experienced tradespeople could result in relatively immediate source of technical capability to work effectively with solar and energy management equipment. Maintenance of solar equipment requires knowledge of electrical circuitry and internal components as well as effective troubleshooting procedures. Energy management requires knowledge of control packages and the application of general principles which promote efficiency. This project addressed the need for training in these areas.

Objectives

The goal of this project was to produce an informed workforce through the development of the following skills: troubleshooting and maintenance of solar systems, a working knowledge of systems circuits and controls, energy evaluation, and the application of energy conservation and management techniques which integrate both traditional and alternate energy sources.

It was anticipated that the skilled tradesperson who had already acquired a knowledge of solar energy would be able to gain the skills needed to retrofit using solar systems and to manage energy of all types in a capable and efficient manner.

The objectives of this project were the following:

1. To develop a practical awareness of energy conservation and management techniques for both commercial and domestic applications.

Objectives (cont'd.)

2. To develop training courses for tradespeople to teach solar systems troubleshooting and maintenance, commercial energy management systems controls and domestic energy management, photovoltaics and windpower.

3. To purchase and install solar and energy management control equipment. This equipment will provide the basis for this training project.

Definition of Terms

A. Renewable energy source - a source such as the sun, the wind geothermal, biomass or water power, that can be used repeatedly as an energy source without diminishing the size of the supply.

B. Alternate energy source - any renewable source which acts as a substitute for non-renewable sources such as gas, oil and coal.

C. Solar energy - energy from the sun which is harnased as an alternate to non-renewable energy sources.

D. Passive solar energy - a type of solar energy used for heating and cooling, both of which can be accomplished by a building design which utilizes the natural environment, blending earth and sun in a manner which facilitates the heating or cooling of interior living spaces.

E. Active solar system - a solar system which utilizes moving parts and flowing liquid or air to accomplish heating or cooling.

F. Photovoltaic cell - an electric device which converts sunlight into direct voltage current.

G. HVAC - an acronym commonly used to reference the heating, ventilating, and air conditioning trade.

H. Energy management - efficient use of energy to power a specific unit (e.g., a heating or cooling unit, an appliance)

I. Energy conservation - prevention of energy waste and loss

J. Windpower - harnessing of wind energy to perform a specific function (e.g., turning a windmill to operate a generator or water pump; moving a sailboat)

Related Research and Background Information

A number of employment studies for the energy field have been published recently. (See bibliography for a listing of these studies.) In general, these studies indicate that employment in specialized energy fields will increase dramatically in the future. Several of the studies, however, conclude that the majority of installation and maintenance work required for solar facilities will come from the HVAC industries and the trades. Two examples of comments and conclusions are the following:

Energy Occupations Handbook (1980), a guide prepared by the Center for Coastal and Environmental Studies at Rutgers University: This study documented job opportunities in various careers as they relate to energy. A need for increased technical skills was revealed, as well as a requirement for integrated technical skills, i.e., skills with solar energy systems combined with other trade skills such as plumbing, electrical power, and heating and air conditioning.

Solar Energy Employment and Requirements, Bechtel National, Inc., a 1980 study: This forecast documented 177 full-time workers in the U.S. labor force in the field of solar energy in 1977, and projected an increase in this figure to 278,981 workers by the year 2000. While this study indicates a definite increase in solar energy labor requirements as time progresses, it also supports the conclusion that fully employed workers will need to combine solar systems capabilities with other technical skills.

The need for increased and integrated technical skills can be exemplified by the type of energy packages sought by industry. Energy management control systems monitor energy output and performance at strategic locations within the industrial or office complex. While it may be impractical or impossible to connect a building completely to solar energy because of cost considerations, it is not impractical or impossible to utilize the basic principles of energy performance gleaned from examination of the solar retrofitting process to more efficiently utilize traditional energy sources. Output (January, 1981), a magazine for the general user of information systems, reported the unveiling of the "Sun/Tropic House" in Stamford, Connecticut. A demonstration facility, this structure may be one of the most energy efficient homes ever built. The house features solar heat and computer energy controls provided by Apple II microcomputers and compatible software developed by W.W. Gaertner Research, Inc. Although the cash outlay for a microcomputer energy monitoring system might now be more than is manageable for the average family, this is not the case for a business organization which can save potentially thousands of dollars each year by managing energy in an efficient manner.

BODY OF REPORT

Procedures

In consultation with advisory councils, professionals in the field of energy management and solar energy, and instructors of various technical disciplines, the preliminary plans for four trade extension courses were developed by the Project Coordinator.

Procedures (cont'd.)

The Project Coordinator, who was hired by the Director to oversee the project, supervised the completion of course curricula, analyzed proposed equipment purchases from technical and educational viewpoints, and monitored installation at the solar facility located on school property in Paramus, New Jersey.

To promote added interest in the energy program, a centerfold advertisement was placed in the Adult Division Course Description Catalog, a publication distributed during August - September 1982, to approximately 8,000 Bergen County residents. In January, 1983, a second bulk mailing went out to County residents, announcing evening courses and new Saturday seminars designed to promote general interest in the new program. A general letter and a flyer announcing the special seminars was also sent to over 100 energy-related businesses in Bergen County. (c.f. Appendix C, Publicity Package) Material for the seminars was taken from the newly developed courses and was designed to serve as an introduction to new technical areas.

Personnel

See Appendix A, Planning Committee, for responsibilities of personnel key to the project.

Schedule of Operations

Summer, 1982:	Publicity accomplished through Schedule of Trade Extension classes for the Fall Semester.
September - December, 1982:	Project Coordinator appointed.
	Planning Committee convened.
	Curriculum research completed, including library work, consultation (advisory committees, field specialists, instructors of various technical disciplines).
	Introduction to Solar Energy Systems and Solar Active Systems (developed during FY'82) conducted through the Trade Extension Division
	Equipment ordered.
	Draft completed for two courses: Energy Management Controls, Solar Troubleshooting and Maintenance.
January - April, 1983:	Publicity for new program accomplished through Schedule of Trade Extension classes for Spring 1983; and a flyer mailed to over 100 Bergen County businesses involved in energy-related fields.
	Saturday Seminars planned (Practical Photovoltaics, Domestic Hot Water Installation, Solar-Assisted Heat Pumps, Energy Management for Business and Industry)
	Curriculum for first two courses finalized (Energy Management Controls, Solar Troubleshooting and Maintenance)
	Curriculum work in progress for two additional trade extension courses.

Schedule of Operations (cont'd.)

April - June, 1983:

Completion of curricula for Photovoltaics and Windpower Systems, Energy Conservation for Residential Dwelling

Evaluation of courses: minor course revisions.

Courses scheduled for implementation during the 1983-1984 school year.

Equipment received.

Findings and Interpretation of Findings

In general, it was discovered that energy technology course offerings showed an approximate 25% increase in student enrollments over the previous year. The Saturday workshop format generated considerable interest and prompted the proposal ideas for an FY'84 energy education project which will include the seminar-workshop concept to instruct business managers in the technology of energy management and conservation.

Courses:

Solar Troubleshooting and Maintenance (72 hours), Energy Conservation for Residential Dwellings (16 hours), Photovoltaics and Wind Power Systems (36 hours), and Energy Management Controls (60 hours) were designed to include a mixture of lecture, demonstration, and shop practice. Each curriculum package includes prerequisite course requirements, student work responsibilities for the class, grading criteria, course outline, unit objectives, suggested shop sessions, and anticipated student competencies upon completion of the course. These courses are scheduled to run for the first time during the fall and spring semesters of the 1983-1984 school year.

During the course development process, it was determined that existing courses in AC Fundamentals provided the electrical background required for technicians in the energy field. The Project Coordinator therefore determined that students without sufficient background in electricity could be channeled to these courses. "Photovoltaics and Wind Power" was selected to replace "Basic Electrical Circuits" due to the recent field emphasis on photovoltaics and renewed interest in the potential of wind power as an energy source.

Based upon the experience of the previous year, each course places emphasis on demonstrations and shop projects. This "learn by doing" philosophy requires less lecture time to accomplish the stated learning objectives and is preferred by the majority of students.

Equipment Purchase:

The initial ordering of equipment presented a problem due to the fact that vendors did not bid on time for the energy management training equipment. Prior to the end of the project year, however, equipment was bidded, ordered and received according to the specifications indicated on the state approval for equipment purchase (Equipment Supplemented Financial Information Back-Up Sheet).

Dissemination Activities

This report, as well as syllabi of the four courses developed during this grant project, is available to the Department of Education, Division of Vocational Education and Career Preparation, for publication and/or dissemination to the Northeast Network for Curriculum Co-ordination, in which the Department participates, and to other educational institutions. The school will make the results of this project available upon request to other area vocational-technical schools and colleges in New Jersey.

Strategies Employed to Eliminate Sex Bias or Sex Role Stereotyping

The School has demonstrated its commitment to equal opportunities for men and women by encouraging students of both sexes to seek careers non-traditional to perceived sex roles through counseling and in descriptive literature and advertising which tends to attract a diverse population. The School has also supported advocacy for women and minority persons through involvement with CETA, through a Career Development Center for Women and through implementation of an electronics training program known as "Women Working Technical", which was federally sponsored by Wider Opportunities for Women. Adult women were recruited this year into automotive mechanics, welding, electronics, electrical technology at the A.A.S. degree level, and oil burner mechanics, we well as, the more traditional courses of study. No female registrants to date have elected to take the solar and energy management courses.

SUMMARY

Conclusions

The project has contributed significantly to the Energy Technology offerings to adults in Bergen County. The curricula developed during the project provided a basis for developing a relatively immediate source of technical capability. The construction of the solar facility provided an opportunity to put into practice the intent of the grant which was to integrate solar energy technology skills with skills common to other trades.

Recommendations

At this time, the Project Coordinator recommends that the various aspects of energy management become the focus for future curriculum and workshop development. This recommendation is based on current business interests to save energy dollars, as well as recent developments in technology which permit the scientific monitoring of energy output.

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Project Effect, Indiana University at South Bend, Indiana, 1979.

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Solar Engineering Magazine, a technical trade periodical published in Dallas, Texas.

Solar Heating and Cooling of Residential Buildings: Sizing, Installation and Operation of Systems. Solar Energy Applications Laboratory at Colorado State University for the U.S. Department of Commerce, 1980.

Solar Job Related Training, Dallas, Texas: Lennox Industries, Inc., 1979.

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Walker, Gene P., Solar Energy Installers Curriculum Guides, Book II. Glen Ellyn, Illinois: College of Dupage, 1980.

APPENDIX A

Project Consultants,
Planning and Advisory Committees

Project Planning Committee

Dr. John Grieco, Project Director

Responsible for fiscal management and monitoring of project.

Mr. Albert Brunner, Project Coordinator

Responsible for curriculum research and development; monitored installation of solar equipment; selected instructors for new courses, monitored implementation and acted as a resource person.

Mr. John Raia

Responsible for supervising exterior construction of the solar lab. (Mr. Raia is a full-time instructor for Construction Trades and a former general contractor and home builder.)

Ms. Susan Mullins

Responsible for project publicity and final writing of the curricula.

ALBERT BRUNNER
2 Cherry Lane
Pomona, New York 10970
(914) 354-0252

EDUCATION

St. Peter's Preparatory School, Jersey City, New Jersey; September 1971 to June 1975.

Niagara University, Niagara, New York
September 1975 to May 1976.

Bergen Community College, Paramus, New Jersey
September 1976 to May 1977.

I have attended various technical seminars sponsored by the Pipefitter's Union.

I represented Bergen Community College at a solar energy workshop held at Delaware Community College in Spring of 1981.

PRESENT EMPLOYMENT

Friendly Ice Cream Corp.
1855 Boston Road
Wilbraham, Massachusetts
December 1981 - Present

Maintenance foreman for 48 divisional restaurants. Responsibilities include complete building maintenance, work with contractors, purchasing equipment, analysis of technical problems, energy auditing and the initiation of cost-saving measures.

Bergen County Vocational-Technical School
200 Hackensack Avenue
Hackensack, New Jersey
September 1980 - Present

Lead teacher for the Energy Technology Program. Project Director for solar building. Curriculum development for college energy courses and trade extension solar technology courses.

PREVIOUS EMPLOYMENT

Paul's Air Conditioning & Refrigeration
44 - 14th Street
Elmwood Park, New Jersey
December 1980-December 1981

Air conditioning, heating, and refrigeration mechanic; a member of Pipefitter's Union Local #274.

C.K. Air Conditioning
106 Paulison Avenue
Clifton, New Jersey
June 1976-November 1980

Bergen County Police Dept.
66 Zabriskie Street
Hackensack, New Jersey
Summer 1975

Park Ranger Division - patrolled various county parks.

SPECIAL ABILITIES

I am thoroughly familiar with all aspects of energy management and conservation, as well as building maintenance procedures and all varieties of refrigeration and air conditioning equipment. Companies for which I have performed work include: New Jersey Bell Telephone, Bell Laboratories; T.R.W., Inc.; Singer, Inc.; Friendly Ice Cream Restaurants and Curtiss Wright.

PERSONAL DATA

Date of Birth	March 9, 1957
Height	6' 1"
Weight	190 lbs.
Health	Excellent

Special Consultants

Bud Lantz, Chair of the Construction Technology Department and Director of the Solar Energy Project at the Manachester, New Hampshire Vocational-Technical School.

Francis Ponti, Instructor of Solar Design, Salem Community College, Salem County, New Jersey.

S. Vincent D'Amore, AIA, River Edge, New Jersey.

Arthur Meyers, Environmental Science Instructor, Ramapo College, Ramapo, New Jersey.

Bergen County Energy Advisory Board

Willis Swales, Chairman	Former Mayor, Montvale. Science Dept. Chairman, Pascack Valley High School
Doug Werner, Vice-Chairman	Owner, Bergen Electric-Car, Hackensack
Theodore Kessler	Assistant Professor of Engineering Technology at Fairleigh Dickinson University
Jane Baumann	Director, Bergen County Consumer Affairs Office
James May	Director of Intergovernmental Affairs, Bergen County
George Tukel	Bergen County Community Action Program
Michael Bialek	Bergen County Community Development
Kevin M. Russell	Acting Director, Bergen County Office of Energy Conservation
James Torpey	Director, Energy Project, Bergen Community College
Benjamin Capaccia	Lyndhurst, New Jersey
Martin Seham	Attorney, Seham, Klein and Zelman, Tenafly
James Williams	Englewood, New Jersey
John Sabo	Construction Engineer in Passaic Valley
Melvin Gelber	Consulting Engineer - Hackensack
George Lordon	Professor - Fairleigh Dickenson Univ.

NJDE 07G004.3

STATE OF NEW JERSEY
DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
AND CAREER PREPARATION
ADVISORY COUNCIL STATEMENT

03 - 0290
CO CODE LEA CODE

THIS FORM IS TO BE SUBMITTED WITH EACH APPLICATION BY PROGRAM AREA. A COPY OF THE FORM IS TO BE PLACED ON FILE WITHIN THE LEA

The Advisory Council described below has reviewed the Application prior to submission.

COUNTY: Bergen LEA NAME: Bergen Co. Voc. Tech.

PROGRAM AREA LETTER: _____ PROGRAM AREA NAME: _____

NAME OF SCHOOL: Bergen County Vocational Technical

SIGNATURE OF ADVISORY COUNCIL CHAIRPERSON Richard Lotenzo
Ernest J Taube

Type of Council (check one):

___ General Advisory Council--assists in the development and maintenance of the entire vocational education program of a school or school district

X Program Advisory Council--serves one program area in a vocational school or the vocational department of a comprehensive high school or adult/post-secondary institution.

Provide an Advisory Council Roster below and indicate affiliation by selecting the proper numeric code:

	NAME	TERM	REPRESENTING (use code)
Chairperson:	Richard Lotenzo / Ernest J Taube	1 year	3
Secretary:	Albert Gasior	" "	1
Members (list):	W. Waurim	" "	3
	B. Jankowsky	" "	4
	Dominick Arecchi	" "	4
	R. Sperling	" "	3
	R. Wallace	" "	3

(continue list of members on reverse side)

(over)

CODES:

1 - Education
2 - Retailing
3 - Industry
4 - Small Business
5 - Government
6 - Labor
7 - Bank and Finance
8 - Student
9 - Alumnus/ae
10 - Cooperative Area Manpower Planning (CAMPS)
11 - Model Cities
12 - Other (describe)

APPENDIX B

Description of the
Alternate Energy Center
at Bergen Tech

BERGEN COUNTY VOCATIONAL-TECHNICAL SCHOOLS

ADULT EDUCATION

PARAMUS SATELLITE

A Description of the Alternate Energy Center

Approximately the size of a typical three-bedroom house, the Alternate Energy Center will be used as a classroom for the new solar energy trade classes for adults and as a demonstration center for the general public.

What can a visitor to the Center expect to see? First, a simple construction with a southern exposure. Second, a solar active hydronic space heating system designed to demonstrate four different modes of operation in conjunction with an auxiliary back-up unit. Third, a passive solar system utilizing over 200 square feet of double insulated glass and several types of heat storage.

Next, a solar heat pump system that does double duty for winter heating and summer cooling. Acrylic glass panels allow the visitor to view the mechanical functions and electrical controls for the system.

Two types of solar domestic hot water heating systems offer applications for residential and commercial use. Additional electric power is provided by a photovoltaic system which converts sunlight into 12-volt electric current. The power is stored and then converted on demand to 115 volts AC.

An energy efficient coal or wood burning stove demonstrates cost savings to homeowners and light commercial manufacturers. Coal and wood are relatively inexpensive fuel sources that are becoming more and more popular.

The ability of wind energy to provide electrical current for heating or air conditioning is demonstrated through a 2 kilowatt wind generator mounted on a 90-foot tower.

The Center will feature the solar systems and information about energy efficient construction and retrofitting. Focusing on low-cost energy alternatives and energy management, the demonstrations, workshops and classes will help the homeowner or industrial manager to understand new energy concepts through simple explanations and by viewing actual operations.

APPENDIX C

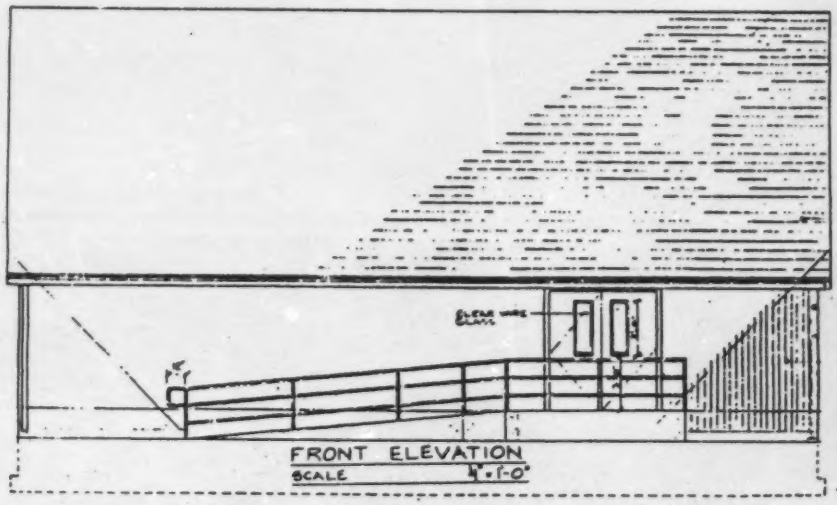
Publicity Package

A. This insert appeared in the Adult Division Course Catalog for 1982-83.

B. This workshop information flyer was distributed to over 100 energy-related businesses in Bergen County. This information also appeared in the Spring 1983 Schedule of Classes.

CENTER FOR ALTERNATE ENERGY SOURCES

PARAMUS N. J.

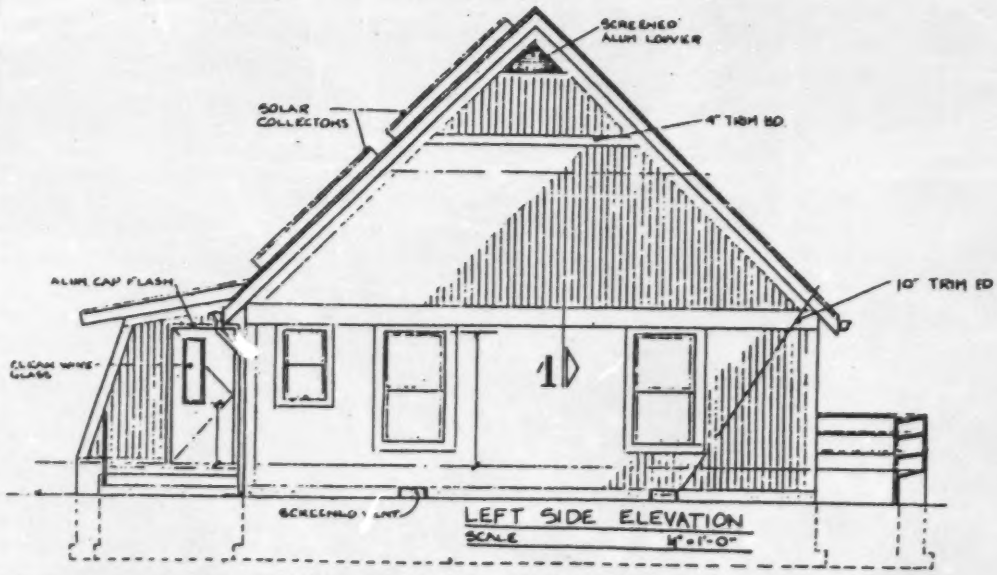


637. Solar Active Systems (72 hrs.)

(offered fall semester only)

This course deals with various active solar systems, including both air and water systems. Domestic hot water and space heating system design, insulation and repair are explained during class sessions and practiced by students at the solar lab. Several visual presentations are also shown during this course.

Fall start: 9-28
Time: 7-10, T, Th
Cost: $81 ($58 tuition, $3 reg. fee, $20 gen. fee)
Place: Solar Lab, Paramus

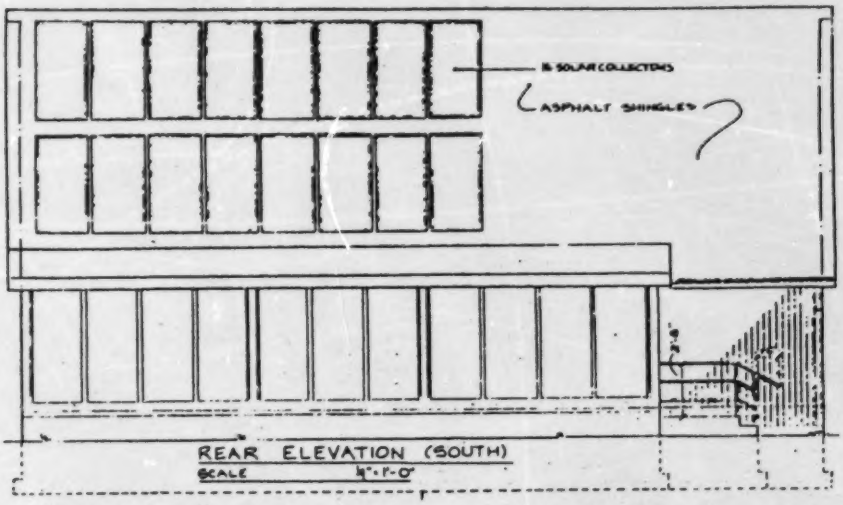


638. Passive Solar Energy Systems (60 hrs.)

(offered spring semester only)

Design, construction and function of passive solar systems are considered in this course. Calculations of system cost and payback are explained for various types of passive systems. Discussion of direct gain, indirect gain, roof ponds, and summer cooling are included.

Spring start: 2-1
Time: 7-10, T, Th.
Cost: $68 ($48 tuition, $3 reg. fee, $17 gen. fee)
Place: Solar Lab, Paramus



639. Energy Management Systems (42 hrs.)

(offered spring semester only)

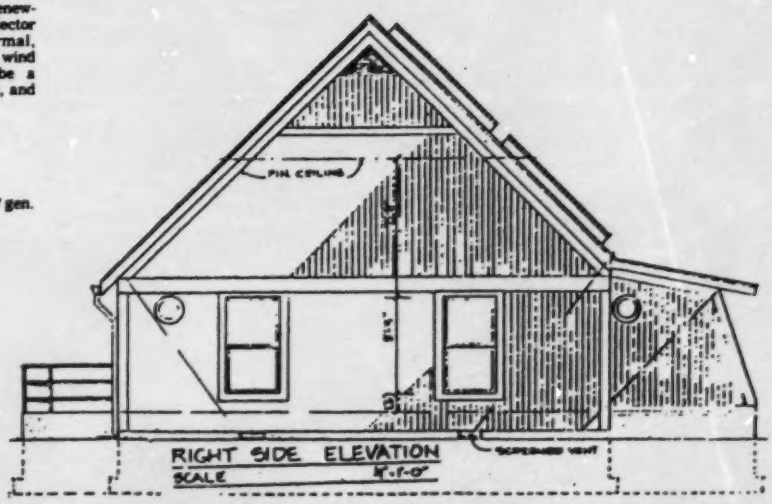
Ways of saving valuable energy sources are explained in this course. The proper procedure for planning and implementing an energy management program is presented in class and practiced by students. Various examples of actual energy saving plans are explored and analyzed. Students will be expected to solve individual energy consumption problems.

Spring start: 1-31
Time: 7-10, M
Cost: $52 ($34 tuition, $3 reg. fee, $15 gen. fee)
Place: Solar Lab, Paramus

636. Introduction to Solar Energy Systems (60 hrs.)

This course serves as an introduction to solar energy technology. Major topics include the principles and theory of renewable energy systems, solar collector heating, photovoltaics, geothermal, biomass, solar passive heating and wind power. The class format will be a combination of lecture, visual aids, and laboratory experience.

Fall start: 9-27
Spring start: 1-31
Time: 7-10, M, W
Place: Solar Lab, Paramus
Cost: $68 ($48 tuition, $3 reg. fee, $17 gen. fee)



(B)

SOLAR SYSTEMS AND ENERGY MANAGEMENT SATURDAY WORKSHOPS

Designed for homeowners, HVAC technicians, solar technicians, and energy management specialists, these workshops will take place in Paramus at the Center for Alternate Energy Sources. The cost for the one-day workshops is $15.00; two-day workshop, $25.00. Classes begin at 8:30 a.m.

Do-It-Yourself Solar Domestic Hot Water Installation (April 16, 1983)

Designed for the homeowner, this one-day workshop will involve participants in a hands-on solar installation including collector mounting, solar loop plumbing, connections to auxiliary hot water tanks, and control wiring. Also covered will be site considerations, permits, kits for the do-it-yourselfer, and information of material suppliers in the northern New Jersey area.

Practical Photovoltaics (April 2, 1983)

The use of solar energy to directly produce electricity will be detailed in this one-day workshop. The emphasis will be on residential and remote applications of photovoltaic (PV) systems. Applications of the technology will be stressed including how to size a PV array, wiring the system to match the load, storage versus utility interface, etc. Workshop participants will install a PV system during the afternoon session. This course is designed for the solar technician.

Solar-Assisted Heat Pumps (January 29 & February 12, 1983)

The use of solar energy to provide a heat source for water-to-air heat pumps will be explored in this two-day workshop designed for HVAC and solar technicians. The majority of the 16 course hours will be spent installing a working, solar-assisted heat pump system including plumbing and controls.

Energy Management Controls for Business and Industry (March 19, 1983)

The rising cost of electricity has spawned equipment designed to reduce peak demand and to allow for closer control of equipment. This one-day course will introduce this equipment including limiters, programmable controllers, and computer-based control systems. Participants will learn the theory of their operation and train on energy management systems including an Apple II Control System. This workshop is designed for HVAC technicians and energy management specialists.

BERGEN COUNTY VOCATIONAL —TECHNICAL SCHOOLS
200 HACKENSACK AVENUE
HACKENSACK, NEW JERSEY 07601

Adult Division: Day (8:30-4:00): 343-6000, ext. 226 or 233;
Evenings (Mon-Thurs. after 6 p.m.): 343-6006